Assessing the Effects of Habitat Alteration on Bay Scallop, *Argopecten irradians*, Populations

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The U.S. EPA's National Health and Environmental Effects Laboratory is developing approaches for protecting and restoring the ecological integrity of aquatic ecosystems from the impacts of multiple aquatic stressors. These approaches will improve assessment methodologies, diagnostic capabilities, and ecological criteria development for managers to be able to protect habitats and restore habitats to meet designated uses. Habitats that are of particular interest to EPA's Office of Water are freshwater and marine wetlands, stream corridors, and marine and Great Lakes coastal zones. We are developing habitat-stressor response models for the bay scallop, *Argopecten irradians*, an economically and societally important marine species. Bay scallops inhabit shallow subtidal habitats along the Atlantic coast of the United States and require settlement substrates, such as submerged aquatic vegetation (SAV), for their early juvenile stages. The short lifespan of bay scallops (1-2 yr), coupled with a dependency on an essential habitat (SAV), renders this species particularly vulnerable to coastal habitat alteration. We are investigating the effects of habitat alteration on bay scallop populations using a three-tiered modeling effort: a Habitat Suitability Index (HSI) for bay scallops, a matrix population model for bay scallops and eelgrass, and a systems model for bay scallops. The benefits of this three-tiered approach are that the habitat model represents the combined interactions of all scallop-habitat relationships, the population model can link habitat alteration effects with demographic attributes of the scallop populations, and the systems model can link habitat alteration effects on the population with ecosystem-scale environmental attributes. Through collaborations with other scallop researchers (in State and Federal governments and academic institutions), we hope to adapt these models for other biogeographic provinces along the Atlantic and Gulf coasts.